Cobalt Digital Inc.

9216-OE-DM

Fiber Receiver / Audio De-Embedder

User Manual

COBALT

openGear

9216-OM
Version: 1.1

9216-OE-DM • Fiber Receiver / Audio De-Embedder User Manual

- Cobalt Digital Inc. Part Number: **9216-OM**
- Document Version: **1.1**
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- Last Author: CGG

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Important Regulatory and Safety Notices

Before using this product and any associated equipment, refer to the "**Important Safety Instructions**" listed below to avoid personnel injury and to prevent product damage.

Products may require specific equipment, and/or installation procedures to be carried out to satisfy certain regulatory compliance requirements. Notices have been included in this publication to call attention to these specific requirements.

Symbol Meanings

This symbol on the equipment refers you to important operating and maintenance (servicing) instructions within the Product Manual Documentation. Failure to heed this information may present a major risk of damage or injury to persons or equipment.

Warning — *The symbol with the word "**Warning**" within the equipment manual indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.*

Caution — *The symbol with the word "**Caution**" within the equipment manual indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.*

Notice — *The symbol with the word "**Notice**" within the equipment manual indicates a situation, which if not avoided, may result in major or minor equipment damage or a situation which could place the equipment in a non-compliant operating state.*

ESD Susceptibility — *This symbol is used to alert the user that an electrical or electronic device or assembly is susceptible to damage from an ESD event.*

Important Safety Instructions

Caution — *This product is intended to be a component product of an 8300 series frame. Refer to the frame User Manual for important safety instructions regarding the proper installation and safe operation of the frame as well as its component products.*

Warning — *Certain parts of this equipment namely the power supply area still present a safety hazard, with the power switch in the OFF position. To avoid electrical shock, disconnect all A/C power cards from the chassis' rear appliance connectors before servicing this area.*

⚠ **Warning** — *Service barriers within this product are intended to protect the operator and service personnel from hazardous voltages. For continued safety, replace all barriers after any servicing.*
This product contains safety critical parts, which if incorrectly replaced may present a risk of fire or electrical shock. Components contained with the product's power supplies and power supply area, are not intended to be customer serviced and should be returned to the factory for repair. To reduce the risk of fire, replacement fuses must be the same time and rating. Only use attachments/accessories specified by the manufacturer.

EMC Notices

United States of America
FCC Part 15

This equipment has been tested and found to comply with the limits for a class A Digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

⚠ **Notice** — *Changes or modifications to this equipment not expressly approved by Cobalt Digital Inc. could void the user's authority to operate this equipment.*

CANADA

This Class "A" digital apparatus complies with Canadian ICES-003.

Cet appariel numerique de la classe "A" est conforme a la norme NMB-003 du Canada.

EUROPE

This equipment is in compliance with the essential requirements and other relevant provisions of **CE Directive 93/68/EEC**.

INTERNATIONAL

This equipment has been tested to **CISPR 22:1997** along with amendments **A1:2000** and **A2:2002**, and found to comply with the limits for a Class A Digital device.

⚠ **Notice** — *This is a Class A product. In domestic environments, this product may cause radio interference, in which case the user may have to take adequate measures.*

Important Laser Safety Measures and Notices

Before using this product and any associated equipment, refer to the sections below so as to avoid personnel injury and to prevent product damage. For further safety information when using fiber products, consult the following publications:

• *IEC-60825- 2, Safety of Laser Products - Part 2: Safety of Optical Fiber Communication Systems (OFCS)* (for use outside of the U.S.A.)

• *ANSI Z136.2, Safe Use of Optical Fiber Communication Systems Utilizing Laser Diode and LED Sources* (for use in the U.S.A.)

Products may require specific equipment, and /or installation procedures be carried out to satisfy certain regulatory compliance requirements.
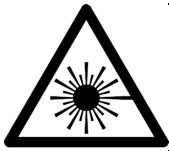
Caution — *Before operating or servicing this product, all personnel should be familiar with laser safety and fiber handling practices.*

Safety Measures for Operation

During normal operation of this product, heed the following safety measures:

• Do not stare at, or into, broken, or damaged, fibers.

• Do not stare at, or into, optical connectors.

• Only properly trained and authorized personnel should be permitted to perform laser/fiber optic operations.

• Ensure that appropriate labels are displayed in plain view and in close proximity to the optical port on the protective housing/access panel of the terminal equipment.

Safety Measures for Maintenance and Servicing
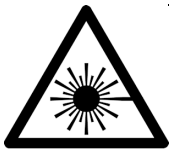
Warning — *Do not use optical equipment, such as a microscope or an eye loupe, to stare at the energized fiber end. Doing so may damage your eyes.*

During maintenance and servicing of this product, only properly trained and authorized personnel shall be allowed to use optical test or diagnostic equipment.

Laser Information

CLASS 1 LASER PRODUCT
IEC 60825-1:2007
Caution — *INVISIBLE LASER RADIATION WHEN OPEN. AVOID EXPOSURE TO THE BEAM.*

Maintenance/User Serviceable Parts

Routine maintenance to this Cobalt Digital Inc. product is not required. This product contains no user serviceable parts. If the frame does not appear to be working properly, please contact Technical Support using the numbers listed under the "Contact Us" section on the last page of this manual. All Cobalt Digital Inc. products are covered by a generous 5-year warranty and will be repaired without charge for materials or labor within this period. See the "Warranty and Repair Policy" section in this manual for details.

Environmental Information

The equipment that you purchased required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

To avoid the potential release of those substances into the environment and to diminish the need for the extraction of natural resources, Cobalt Digital Inc. encourages you to use the appropriate take-back systems. These systems will reuse or recycle most of the materials from your end-of-life equipment in an environmentally friendly and health conscious manner.

The crossed-out wheeled bin symbol invites you to use these systems.
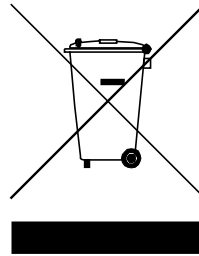
If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration.

You can also contact Cobalt Digital Inc. for more information on the environmental performances of our products.

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Introduction

In This Chapter

This chapter contains the following sections:

- Overview

- 9216-OE-DM Functional Block Diagrams

- Documentation Terms and Conventions

A Word of Thanks

Congratulations on choosing a **9216-OE-DM AES/EBU Fiber Audio De-Embedder**. The Cobalt Digital Inc. line includes video decoders and encoders, audio embedders and de-embedders, distribution amplifiers, format converters, and much more. Cobalt Digital Inc. modular conversion gear will meet your signal conversion needs now, and well into the future.

Should you have a question pertaining to the installation or operation of your 9216-OE-DM, please contact us at the numbers listed on the back cover of this manual. Our technical support staff is always available for consultation, training, or service.

Overview

The 9216-OE-DM AES/EBU Audio De-Multiplexer with Fiber Optic Input is a broadcast quality de-embedder with one multi-rate SDI input which supports up to eight AES (16 channels) audio outputs. The AES outputs are 75ohm unbalanced. A single mode fiber interface with a LC/UPC connector provides an SDI input. A selectable coax input is also provided.

The 9216-OE-DM can produce up to eight AES outputs, extracting them from any of the 16 possible audio channels of the SD or HD-SDI input. The AES outputs are 48kHz, synchronous with the video output. The AES outputs have the following adjustments available: delay, gain, and invert.

Card status and control parameters are displayed in the DashBoard Control System™.

Features

The 9216-OE-DM includes the following features:

- Supports HD-SD SDI SMPTE 292M, 1.5Gbps and SMPTE 259M, 270Mbps

- Supports AES-3id-2001, and EBU tech 3250

- Audio de-embedding for all popular formats 480i, 576i, 720p, and 1080i

- Eight AES-3id 75ohm unbalanced outputs on DIN 1.1/2.3 connectors

- One SDI processed output

- Automatic input video format detection

- SNMP support available

- User defined loss of signal output

- Audio controls such as gain, invert, and delay

- Internally generated test patterns and test tones

- Reports status and configuration remotely via the DashBoard Control System™

- Fits 20-slot frames

- 5-year transferable warranty

9216-OE-DM Functional Block Diagrams

This section provides a functional block diagram that outlines the signal flow of the 9216-OE-DM.
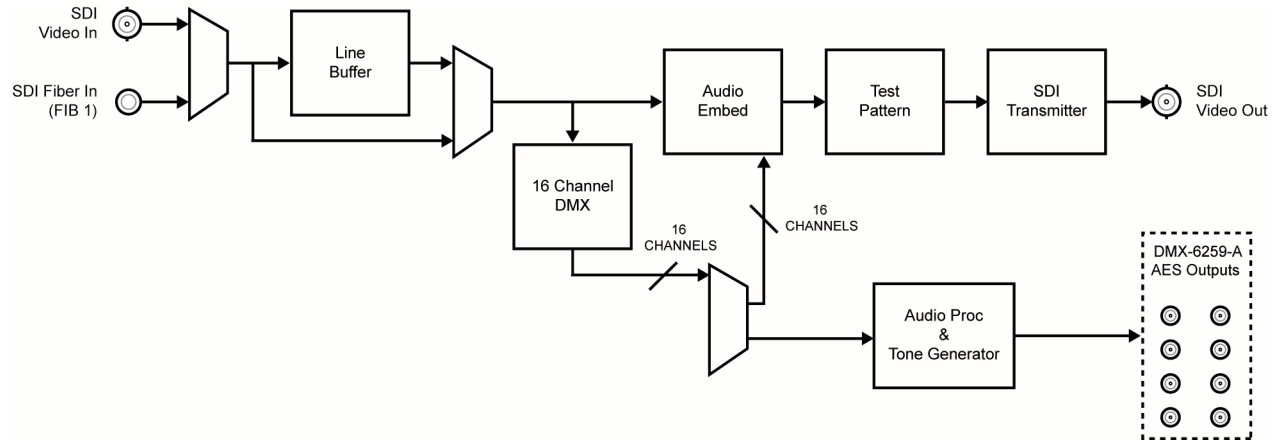
Figure 1.1 *9216-OE-DM — Simplified Block Diagram*

Documentation Terms and Conventions

The following terms and conventions are used throughout this manual:

- "**Frame**" refers to a 20-slot frame that houses the 9216-OE-DM, as well as any openGear frames.

- "**Operator**" and "**User**" refer to the person who uses 9216-OE-DM.

- "**Board**", and "**Card**" refer to openGear terminal devices within openGear frames, including all components and switches.

- "**System**" and "**Video system**" refer to the mix of interconnected production and terminal equipment in your environment.

- "**-line mode** " refers to broadcast situations using **NTSC** composite (analog) signal reference inputs.

- "**-line mode** " refers to broadcast situations using **PAL-B** composite (analog) signal reference inputs.

- "**PAL**" refers to PAL-B and PAL-G unless otherwise stated.

- The "**Operating Tips**" and "**Note**" boxes are used throughout this manual to provide additional user information.

Installation

In This Chapter

This chapter provides instructions for installing the Rear Module(s) for the 9216-OE-DM, installing the card into the frame, cabling details, and updating the card software. The following topics are discussed:

- Before You Begin

- Installing the 9216-OE-DM

- Cabling for the 9216-OE-DM

- Software Upgrades for the 9216-OE-DM

Before You Begin

Before proceeding with the instructions in this chapter, ensure that your 20-slot frame is properly installed according to the instructions in the *8300 Series User Manual*.

Static Discharge

Throughout this chapter, please heed the following cautionary note:

ESD Susceptibility — *Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Always exercise proper grounding precautions when working on circuit boards and related equipment.*

Unpacking

Unpack each 9216-OE-DM you received from the shipping container and ensure that all items are included. If any items are missing or damaged, contact your sales representative or Cobalt Digital Inc. directly.

Working with Fiber Optic Connectors

Keep the following in mind when working with fiber optic connectors:

- Every time you are required to insert a connector into a device or mating sleeve, you must clean the connector. All exposed surfaces of the ceramic ferrule must be clean. Follow your facility practices of cleaning fiber optic connectors.

- Connectors must always be inserted into a device or have a dust cap on. Refer to **Figure 2.1** for dust cap locations.

- A poor optical connection is often similar to a poor electrical connection. Try removing the connector, cleaning, and re-inserting the connector. A bad connection can result in experiencing instability of signal, high loss, or a noisy signal.

Fiber 1 Port for Cable (Dust Cap On)

Connection to Fiber 1 Port on Rear Module (Dust Cap On)

Fiber 1 Port to Card (Dust Cap On)

Card-edge Connector
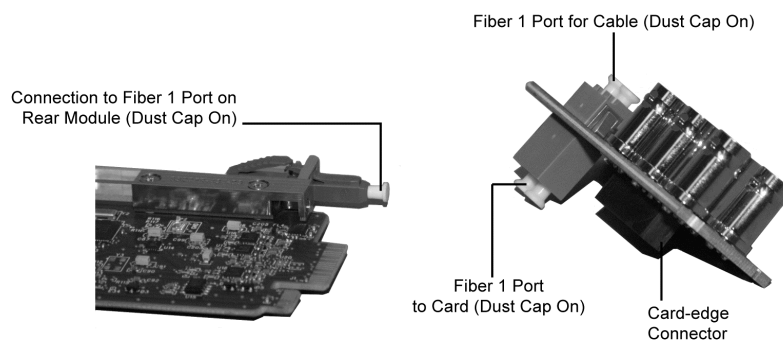
Figure 2.1 *Card Connectors with Dust Caps Installed*

Installing the 9216-OE-DM

This section outlines how to install a Rear Module in a 20-slot frame. You cannot install the 9216-OE-DM in a 8310 series or a 8320 series frame.
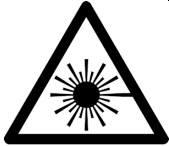
Caution — *Never attempt to look down the barrel of a connected fiber or device transmitting an optical signal. The transmitted light is not in the visible spectrum and may cause permanent eye damage. Turn off all laser sources before disconnecting devices.*

Rear Modules for the 9216-OE-DM

When installing the 9216-OE-DM in a 20-slot frame, the **RM20-9216-B** Full Rear Module is required. Refer to the section "**20-Slot Frame Cabling Overview**" for cable designations.

Installing a Rear Module

If the Rear Module is already installed, proceed to the section "**Installing the 9216-OE-DM**".

Use the following procedure to install a Rear Module in your 20-slot frame:

1. Locate the card frame slots on the rear of the frame.

2. Remove the Blank Plate from the slot you have chosen for the 9216-OE-DM installation.

3. Remove the dust cap from the Fiber ports on the Rear Module that faces the interior of the frame. Refer to **Figure 2.1** and **Figure 2.2** for dust cap locations.
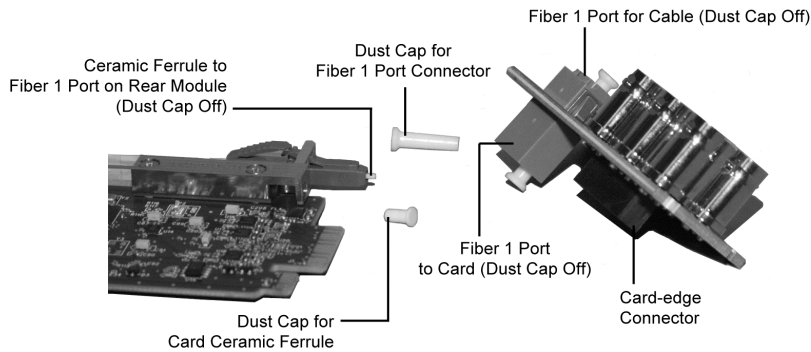
Figure 2.2 *Card Connectors Connectors with Dust Caps Removed*

4. Install the bottom of the Rear Module in the **Module Seating Slot** at the base of the frame's back plane.

5. Align the top hole of the Rear Module with the screw on the top-edge of the frame back plane.

6. Using a Phillips screwdriver and the supplied screw, fasten the Rear Module to the back plane of the frame. Do not over tighten.

7. Ensure proper frame cooling and ventilation by having all rear frame slots covered with Rear Modules or Blank Plates.

This completes the procedure for installing a Rear Module in your 20-slot frame.

Installing the 9216-OE-DM

The 9216-OE-DM uses a single mode, LC/UPC connector to interface with the **RM20-9216-B** Full Rear Module. This section outlines how to install the 9216-OE-DM in a 20-slot frame.

Use the following procedure to install the 9216-OE-DM in a 20-slot frame:

1. Locate the Rear Module you installed in the procedure "**Installing a Rear Module**".

2. Ensure that the Rear Module the **RM20-9216-B** Full Rear Module.

3. Remove the dust caps from the connector on the card end.

   • Refer to **Figure 2.1** and **Figure 2.3** for dust cap locations.

   • Refer to the section "**Important Laser Safety Measures and Notices**" at the beginning of this manual for safety information when handling fiber optic components.
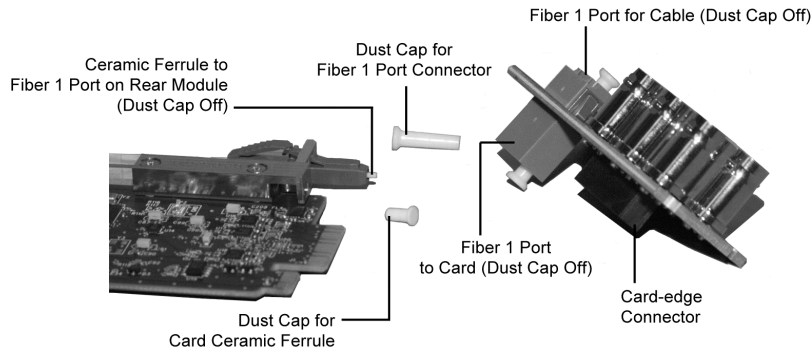
Figure 2.3 *Card Connectors with Dust Caps Removed*

4. Ensure that the exposed surface of the ceramic ferrule of the connectors is clean. Refer to the section "**Working with Fiber Optic Connectors**" for cleaning tips.

5. Hold the card by the edges and carefully align the card-edges with the slots in the frame.

6. Fully insert the card into the frame until the rear connection plus is properly seated in the Rear Module. You will feel a click when the card mates onto the rear module.

7. Affix the supplied **Rear Module Label** to the BNC area of the Rear Module.

8. Remove the dust cap from the Fiber 1 port (the topmost fiber optic port) on the Rear Module that faces the exterior of the frame.

9. Ensure the ceramic ferrule of the Fiber 1 port connector is clean..

10. Cable your rear module as outlined in the section "**Cabling for the 9216-OE-DM**".

This completes the procedure for installing the 9216-OE-DM in a 20-slot frame.

Cabling for the 9216-OE-DM

This section provides information for connecting cables to the installed Rear Modules on the 20-slot frames. Connect the input and output cables according to the following sections.

The optical connector used to mate the card to the rear module is designed for blind mate optical connectors. All fiber interfaces are single mode fibers.

Notice — *Never attempt to look down the barrel of a connected fiber or device transmitting an optical signal. The transmitted light is not in the visible spectrum and may cause permanent eye damage. Turn off all laser sources before disconnecting devices.*

20-Slot Frame Cabling Overview

In the 20-slot frames, the 9216-OE-DM is used with the **RM20-9216-B** Full Rear Module. Each card occupies two slots and provides one fiber input, one SDI input, one SDI output, and eight AES unbalanced outputs at 75ohm. (**Figure 2.4**)

Note — *You must use the **Setup** tab in DashBoard to specify which SDI Source to use as the input (BNC or Optical Port).*
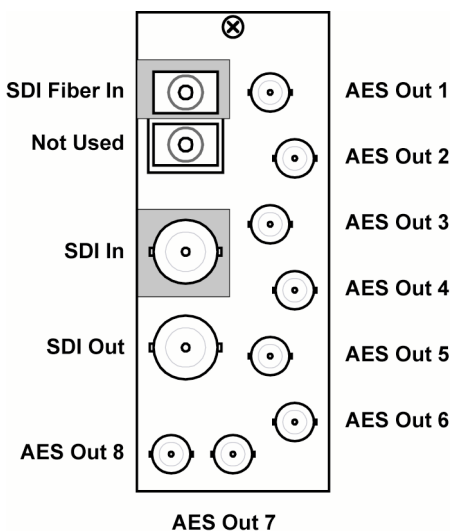
AES Out 7
Figure 2.4 *Cable Connections for the **RM20-9216-B** Rear Module*

Software Upgrades for the 9216-OE-DM

This section provides instructions for installing a license key and upgrading the software for your 9216-OE-DM using the DashBoard Control System™.

Performing Software Upgrades

DashBoard enables you to upload software updages to the 9216-OE-DM.

Use the following procedure to upload software to the 9216-OE-DM:

1. Contact Technical Support for the latest software version file.

2. In DashBoard, display the **Device** tab of the 9216-OE-DM by double-clicking its status indicator in the **Basic Tree View**.

3. From the **Device** tab, click **Upload** to display the **Select File for upload** dialog box.

4. Navigate to the *.bin upload file you wish to upload. DashBoard automatically selects the last directory that you loaded from.

5. Click **Open** to display a confirmation dialog box. This dialog box displays the selected upload file name, type, size, and the file creation date.

6. From the **Confirmation** dialog box, select one of the following:

   • **Cancel** — Select this option to cancel the upload of the file and return to the **Device View**.

   • **Continue** — Select this option to upload the file. While uploading, an **Uploading Progress** dialog box opens.

⚠ **Notice** — *Pressing the **Cancel** button while uploading will leave the card in an invalid state. Do not click **Cancel** unless the uploading progress has stopped completely for 60 seconds or more. If upload fails, repeat the upload process from DashBoard. If the upload process fails again, refer to the section "**Bootload Button**".*

7. Monitor the upgrade progress bar displayed in DashBoard while the software is upgraded on your 9216-OE-DM.

8. To complete the upgrade process, you must reboot the card as follows:

Note — *The communications processor of the 9216-OE-DM requires approximately 30 seconds to re-start and re-establish network communications.*

   • The 9216-OE-DM automatically saves all your settings before starting the reboot process.

   • The status of all the cards in the frame are grayed out until the reboot process is complete.

This completes the procedure to upload software to the 9216-OE-DM.

User Controls

In This Chapter

This chapter provides a general overview of the user controls available on the 9216-OE-DM.

The following topics are discussed:

- Card Overview

- Control and Monitoring Features

- Reference Compatibility

- Operation Notes

Card Overview

This section provides a general overview of the 9216-OE-DM components.
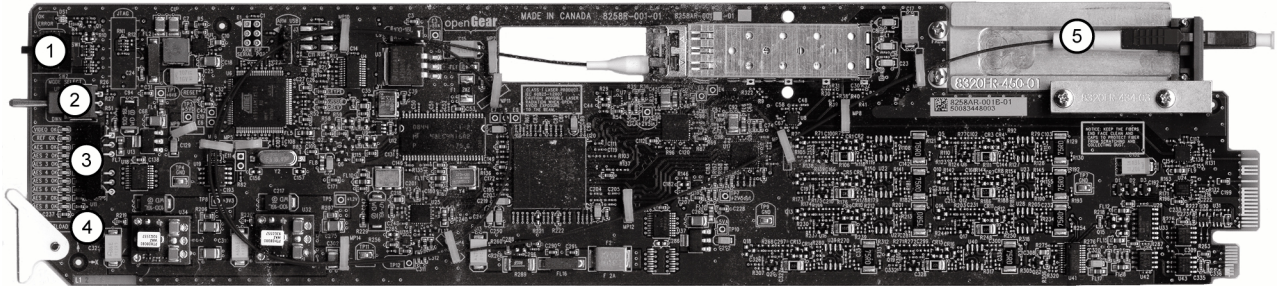
Figure 3.1 *9216-OE-DM — Card-edge Components*

1) Function Select Switch	3) Four Character Display	5) Fiber Optic Connector
2) Mode Select Switch	4) Bootload Button	

1. Function Select Switch

Use this switch to select general operation functions and menu items. This switch works in conjunction with the Mode Select Switch.

2. Mode Select Switch

Use this switch to enable, disable, and select specific configurations within the operational function modes menu (selected first with the Function Select Switch).

3. Four Character Display

This display is located on the card-edge and reports the menu and options selected using the Function Select Switch and the Mode Select Switch.

4. Bootload Button

Use this button for factory service in the unlikely event of a complete card failure. Do not press this button unless instructed to do so by Cobalt Digital Inc. Technical Support personnel.

5. Fiber Optic Connector

The 9216-OE-DM use a blind mate, single mode, LC/UPC connector to interface with the Full Rear Module (RM20-9216-B). The rear module is passive, which allows for the 9216-OE-DM to be replaced without the need to remove any connected BNC or fiber optic cables.

The fiber optic connector for the card includes a dust cap. The dust cap must stay on at all times when not installed in a frame. Ensure to keep the fibers end face clean and use the caps to protect the fiber from scratches and collecting dust.

For More Information...

- on using the switches, refer to the section "**Card-edge Menu System**".

- on the LEDs located on the card-edge, refer to the section "**Status and Selection LEDs on the 9216-OE-DM**".

- on handling fiber optic components, refer to the section "**Important Laser Safety Measures and Notices**" at the beginning of this manual.

- on using fiber connectors, refer to the section "**Working with Fiber Optic Connectors**".

Control and Monitoring Features

This section provides information on the card-edge LEDs for the 9216-OE-DM. Refer to **Figure 3.2** for the location of the LEDs and controls.
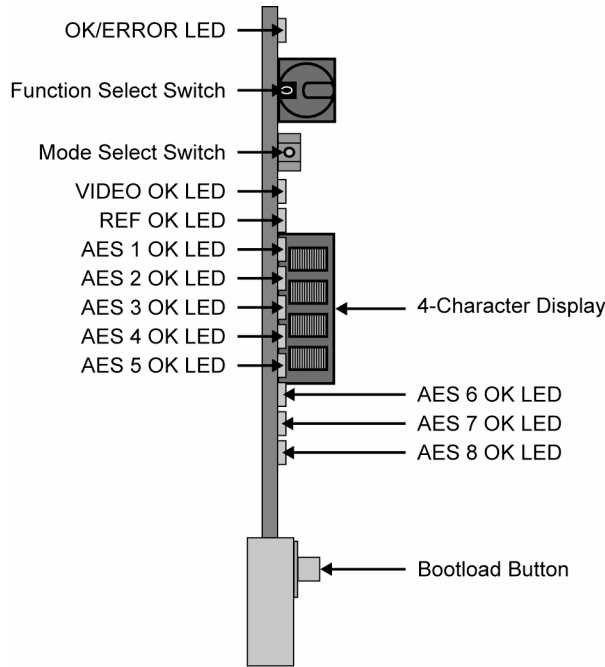
Figure 3.2 *9216-OE-DM Card-edge Controls*

Status and Selection LEDs on the 9216-OE-DM

The front-edge of the 9216-OE-DM has LED indicators for the power, video input status, and communication activity. Basic LED displays and descriptions are provided in **Table 3.1**.

Table 3.1 LEDs on the 9216-OE-DM

LED	Color	Display and Description
OK/ERROR	Green	When lit green, this LED indicates that the card is functioning normal and that no anomalies have been detected. The following conditions must be satisfied: • a valid input signal is present • a valid reference signal is present when a reference is required, and that the reference standard matches the input standard.
	Flashing Green	When flashing green, this LED indicates the bootloader is waiting for a software upload.
	Flashing Green and Orange	When lit green with flashing orange, this LED indicates there is a signal error such as a missing or invalid input or reference.
	Orange	When lit orange, this LED indicates the card is powering on.

LED	Color	Display and Description
	Red	When lit red, this LED indicates the card is not operational.
	Off	When off, this LED indicates there is no power to the card.
VIDEO OK	Green	When lit, this LED indicates that the video input is valid.
	Flashing Green	When flashing, this LED indicates that video is present, but the input format is unsupported.
	Off	When unlit, this LED indicates the absence of an input signal.
REF OK	Green	When lit green, this LED indicates a valid reference signal.
	Flashing Green	When flashing, this LED indicates that the reference signal is present but the format is invalid.
	Off	When unlit, this LED indicates that a reference signal is not present, or is not supported.
AES 1 OK	Yellow	When lit, this LED indicates the presence of the embedded audio Group 1 on the video input.
AES 2 OK	Yellow	When lit, this LED indicates the presence of the embedded audio Group 2 on the video input.
AES 3 OK	Yellow	When lit, this LED indicates the presence of the embedded audio Group 3 on the video input.
AES 4 OK	Yellow	When lit, this LED indicates the presence of the embedded audio Group 4 on the video input.
AES 5 OK	Yellow	This LED is not implemented.
AES 6 OK	Yellow	This LED is not implemented.
AES 7 OK	Yellow	This LED is not implemented.
AES 8 OK	Yellow	This LED is not implemented.

Reference Compatibility

It is important to remember that if you are using Frame 1 or Frame 2 as the reference, the input video frame rate must match the reference frame rate.

Frame Rate Compatibility

Refer to **Table 3.2** for frame rate compatibility.

Table 3.2 *Compatible Video Formats*

Reference	Output					
	480i/59.94	720p/59.94	1080i/59.94	576i/50	1080i/50	720p/50
480i/59.94	✔	✔	✔			
720p/59.94	✔	✔	✔			
1080i/59.94	✔	✔	✔			
576i/50				✔	✔	✔
720p/50				✔	✔	✔
1080i/50				✔	✔	✔

Operation Notes

This section provides brief notes when operating the 9216-OE-DM.

Audio Proc Amp Controls

The 9216-OE-DM includes Processing Amplifiers (Proc Amps) for the audio outputs on the card. Note that these features are not available when using the card-edge controls.

Proc Amp adjustments are applied in the following order:

1. Delay — This option enables you to adjust the delay of the audio channel. If you have enabled the Delay Lock feature, changing the delay value for one channel automatically changes the value for the other channel.

2. Gain — This option allows you to adjust the gain by +/- 20dB in 1dB increments. If you have enabled the Gain Lock feature, changing the gain value for one channel automatically changes the value for the other channel.

3. Invert — This option enables you to invert the polarity of the audio signal for the selected channel.

Minimum Delay Overview

The line buffer stores incoming video in relation to the incoming video clock timing. The video data is then read out in relation to the reference timing. This allows the input video to be switched between sources that may not be perfectly timed without timing glitches. Video source timing must remain within the buffer window to properly switch between sources. **Table 3.3** provides information on the buffer window available depending on how the Minimum Delay feature is configured in DashBoard.

Table 3.3 *Minimum Delay*

If the option is...	Format	Minimum Delay	Maximum Delay
Disabled	HD	1/4 line	1/2 line
	SD	1/4 line	1/2 line
Enabled	HD	1/64 line	1/32 line
	SD	1/32 line	1/16 line

Menus

In This Chapter

This chapter provides a summary of the menus available for the 9216-OE-DM.

The following topics are discussed:

- SNMP Monitoring and Control

- DashBoard Menus for the 9216-OE-DM

- Card-edge Menu System

SNMP Monitoring and Control

The Network Controller Card in the 20-slot frame provides optional support for remote monitoring of your frame and using the Simple Network Management Protocol (SNMP), which is compatible with many third-party monitoring and control tools.

Refer to your 9216-OE-DM Management Information Base (MIB) file for a breakdown of SNMP controls on this card. Refer to the *8300 Series User Manual* and *MFC-8300 Series User Manual* for additional information on SNMP Monitoring and Control.

DashBoard Menus for the 9216-OE-DM

This section briefly summarizes the menus, items, and parameters available from the DashBoard Control System™ for the 9216-OE-DM. Parameters marked with an asterisk (*) are the factory default values. The DashBoard Control System™ enables you to monitor and control openGear frames and cards from a computer. DashBoard communicates with other cards in the 20-slot frame through the Network Controller Card.

Status Tab

Table 4.1 summarizes the **Status** tab parameters available in DashBoard for the 9216-OE-DM. The **Status** tabs provide read-only information such as software revision issue, reference status, input format, and power consumption.

Table 4.1 Status Tab Items

Menu	Item	Parameters	Description
Product (Read-only)	Product	9216-OE-DM	
	Supplier	Cobalt Digital Inc.	
	Board Rev	##	
	Rear Module	#	Type of rear module in the slot
	Board S/N	######	Indicates the card serial number
	Software Rev	##.##	Indicates the software version
	Firmware Rev	#.###	Indicates the firmware version
Hardware (Read-only)	HW Status	OK	Indicates the status of the hardware including the SFP module. Some messages displayed are dependent on the settings in the **Alarms Enable** tab.
		FPGA load invalid	
		Incomp I/O Module	
		Current out of spec	
		Internal Error	
		SFP Temp Low	
		SFP Temp High	
		SFP Power High	
		SFP Power Low	
		SFP Not Detected	
	Voltage (mV)	#	Supply Voltage
	Current (mA)	#	Current consumption of card

Menu	Item	Parameters	Description
Hardware (Read-only)	Optical Module Temperature (C)	#	
	CPU Headroom	#	Processing power available
	RAM Available	#/##	On-board processing memory available
	Uptime (h)	#	Displays the number of hours since the last reboot of the card
	Configuration Bank	#	Storage count
Signal (Read-only)	Signal Status	OK	Indicates when the channel is functioning normally or if anomalies are detected
		No Input	
		Invalid Format	
		Incompatible	
		Non-Sync Video	
		Group Not Present	
		Group Channel Silent	
	Audio Status	OK	Indicates the status of the audio source
		PCM - Silent	
		Source Async	
		Group 4 Reduced to 20bit[*]	
	Reference Status	OK	Indicates that a valid reference source is present
		No Ref - Video	The following conditions are occurring: • Card reference is set to Frame 1 or Frame 2 • A valid reference signal is not present • Card has gone to Video Timing Mode

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[*]This parameter indicates that there are more than 3 groups of 24bit SD embedded audio sources.

Menu	Item	Parameters	Description
Signal (Read-only)	Reference Status	No Ref - Free Run	The following conditions are occurring: • Card reference is set to Frame 1 or Frame 2 • A valid reference signal is not present • A valid video signal is not present • Card has gone to Free Run Mode
		Invalid Format - Video	Card has detected an invalid[†] reference format and has switched to Video Timing Mode
		Invalid Format - Free Run	The following conditions are occurring: • Card has detected an invalid[b] reference format • Input video is missing or invalid • Card has switched to Free Run Mode
	Input Format	#	Indicates the input video format
	Reference Format	#	Indicates the reference video format
	Output Format	#	Indicates the output video format
	Optical Module Status	OK	Indicates the status of the card Optical Module
		Temp High	
		Temp Low	
		Rx Power High	
		Rx Power Low	
		Rx Fault	
		Not Detected	
Signal – Embedded A udio Status (Read-only)	Group #	PCM	Indicates the status of the incoming embedded audio
		No Input	
		PCM-Silent	
		Non-PCM	
		Async	
		Mixed	

[†]Refer to the section "**Reference Compatibility**" for a complete list of supported references.

Setup Menus

Table 4.2 summarizes the **Setup Menu** options available in DashBoard.

Table 4.2 Setup Menu Items

Menu	Item	Parameters	Description
Setup	SDI Source	Copper	Assigns the BNC as the SDI input source
		Optical*	Assigns Optical Port 1 as the SDI input source
	Reference	Frame 1*	Selects the reference source
		Frame 2	
		Video	
	Minimum Delay	Checkbox selected*	Provides the shortest video delay through the card. When using SD, the delay is 7µs. When using HD, the delay is 1.5µs.
		Checkbox unselected	The total video delay through the card will be the values above plus half a video line
	Loss of Input	Black	Sets the output to Black in the event of a loss of video input
		Blue	Sets the output to Blue in the event of a loss of video input
		Custom*	Sets the output to a custom color in the event of a loss of video input. Use the Y, Cr, and Cb sliders to configure the color.
		Y slider	Sets the luminance component of the Loss of Input Custom video signal.
		Cr slider	Sets the Cr component of the Loss of Input Custom video signal.
		Cb slider	Sets the Cb component of the Loss of Input Custom video signal.
	Test Pattern‡	None	Specifies the type of test pattern to output
		100% Color Bars	
		Frequency Sweep	
		Black	
		Blue	
Setup	Test Pattern	Matrix Pathological	Specifies the type of test pattern to output

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‡This setting is not retained on power down.

Menu	Item	Parameters	Description
		Luma Ramp	
		Y/C Ramp	
		75% SMPTE Bars	
	SD Audio	20 Bit*	Embeds 20bit audio
		24 Bit	Embeds 24bit audio
		Auto	Embeds 20-24bit audio depending on the source and number of bits
	Silence Threshold (dB)	-96 to 0	Audio below the specified threshold value is considered silent
	Silence Timeout (sec)	1 to 60	Audio silent for longer than the specified value raises an alarm
	Edit Permission	Unlocked*	All menu options are unlocked and can be edited.
		Locked	All menu items, except this one, are locked and read-only.
	All Audio	Reset	Resets the parameters in the Embedded Audio Outputs tab to factory defaults
	Factory Defaults	Reset	Resets all parameters to factory defaults.

Input Status Menus

Table 4.3 summarizes the **Input Status Menu** options available in DashBoard.

Table 4.3 Input Status Menu Items

Menu	Item	Parameters	Description
Input Status	Input Format (Read-only)	#	Displays the format of the video input
	CRC Errors (Read-only)	#	Displays the count of the CRC errors on the video input. This 14bit counter is reset on loss of video, or by user request. The counter is non-latching, and will roll over from maximum count to zero. • For SD formats, it displays both active picture and full frame errors. • For HD formats, it displays the total count of errors.
Input Status	Error Count	Reset	Resets the CRC Errors field

Menu	Item	Parameters	Description
	Embedded Audio - Group # Channel # (Read-only)	PCM	Displays the status of each group and channel of embedded audio
		No Input	
		PCM-Silent	
		Non-PCM	
		Async	
		Mixed	
	Word Length (Read-only)	#bit	Displays the word length of the audio in number of bits

AES Outputs 1-8 Menus

Table 4.4 summarizes the **AES Outputs 1-4** and **AES Outputs 5-8 Menus** options available in DashBoard.

Table 4.4 AES Outputs 1-8 Menu Items

Menu	Item	Parameters	Description
AES #	Ch A Source	Mute	Selects the source of the AES output
		Group # Ch#	
		#Hz	
		#kHz	
	Ch B Source	Same as above	
	Ch A Delay (ms)	0* to 1000	Adjusts the delay of the audio channel
	Ch B Delay (ms)	Same as above	
	Delay Lock	Checkbox selected*	Locks the Delay slider of both channels together. If the values for the two channels are different, that change is maintained when the channels are locked.
		Checkbox unselected	The Delay slider is unlocked
	Ch A Gain (dB)	-20 to +20§	Adjusts the gain of the audio channel
	Ch B Gain (dB)	Same as above	

---

§The default value is 0.

Menu	Item	Parameters	Description
AES #	Gain Lock	Checkbox selected*	Locks the Gain slider of both channels together. If the values for the two channels are different, that change is maintained when the channels are locked.
		Checkbox unselected	The Gain slider is unlocked
	Ch A Invert	Checkbox selected	Inverts the audio signal of the channel
		Checkbox unselected*	The audio signal is not inverted
	Ch B Invert	Same as above	
	Output	Reset	Resets the parameters for the selected output to the default values
	Outputs #-#	Reset	Resets the indicated output parameters to the default values

Embedded Outputs Menus

Table 4.5 summarizes the **Embedded Outputs Menu** options available in DashBoard.

Table 4.5 Embedded Outputs Menu Items

Menu	Item	Parameters	Description
Group #	Enable	Checkbox selected*	Determines if the group is inserted in the output or not
		Checkbox unselected	
	Ch # Source	Mute	Configures the Primary Source that is inserted in to the embedded group if present
		Group# Ch#	
		#Hz Tone	
		#kHz Tone	
Group #	Group #	Reset	Resets the specific group sources to the default values
	All Groups	Reset	Resets all groups to the default values

Alarm Enables Menus

Table 4.6 summarizes the **Alarm Enables Menu** options available in DashBoard.

Table 4.6 Alarms Menu Items

Menu	Item	Parameters	Description
Video Input & Reference Alarm	No Input	Checkbox selected*	Signal Status field reports a loss of input
		Checkbox unselected	Disables the alarm
	Invalid Input	Checkbox selected*	Input Format field displays an alarm when the input video is a format that is not supported
		Checkbox unselected	Disables the alarm
	Incompatible Input	Checkbox selected*	Input Format field reports when the frame rate is not the same as the reference input
		Checkbox unselected	Disables the alarm
	Non-Sync Input	Checkbox selected*	Signal Status field reports if the video input is asynchronous to the reference
		Checkbox unselected	Disables the alarm
	No Reference	Checkbox selected*	Reference Status field reports loss of input conditions
		Checkbox unselected	Disables the alarm
	Invalid Reference	Checkbox selected*	Reference Format field reports when the reference is a format that is not supported
		Checkbox unselected	Disables the alarm
Hardware	Incompat Rear Module	Checkbox selected*	Hardware Status field reports when a rear module is not compatible with the card
		Checkbox unselected	Disables the alarm
Optical Module Alarms	Alarm on Abnormal Temperature	Checkbox selected*	Hardware Status field reports when the temperature of the SFP module is not in range (high/low)
		Checkbox unselected	Disables the alarm
	Alarm on Abnormal Power	Checkbox selected*	Hardware Status field reports when the power consumption of the SFP module is not in range (high/low)
		Checkbox unselected	Disables the alarm

Menu	Item	Parameters	Description
Optical Module Alarms	Alarm on Not Detected	Checkbox selected*	Hardware Status field reports when the optical module is not detected
		Checkbox unselected	Disables the alarm
Embedded Input Audio - Group #	Group not present	Checkbox selected*	Signal Status field reports when a group is not present on the input
		Checkbox unselected	Disables the alarm
	Channel # Silent	Checkbox selected*	Signal Status field reports when the specified channel is detected as silent
		Checkbox unselected	Disables the alarm
AES Outputs - AES #	Source Missing	Checkbox selected*	Audio Status field reports when the source is not detected
		Checkbox unselected	Disables the alarm
	Source Async	Checkbox selected*	Audio Status field reports when the selected output source is asynchronous to the input video
		Checkbox unselected	Disables the alarm
Embedded Outputs - Group #	Source Missing	Checkbox selected*	Embedded Audio Status field reports when the selected source is not present or is silent
		Checkbox unselected	Disables the alarm
	Source Async	Checkbox selected*	Embedded Audio Status field reports when the selected source is asynchronous to the input video
		Checkbox unselected	Disables the alarm
	SD 24Bit	Checkbox selected*	Audio Status field reports when the selected configuration would embed 4 groups of 24bit audio in an SD output. Group 4 is down-sampled to 20bit audio.
		Checkbox unselected	Disables the alarm
	All Alarms	Set	Enables all alarms
	All Alarms	Clear	Disables all alarms

Card-edge Menu System

This section summarizes the Card-edge Menu system of the 9216-OE-DM and how to navigate the menus and options using the **SW1** and **SW2** switches on the 9216-OE-DM card-edge. A list of the available menus and parameters is provided in **Table 4.7**.

Navigation

Use the following procedure to navigate the card-edge menus of the 9216-OE-DM:

1. Rotate **SW1** to the required menu.

2. Toggle **SW2** to select the required parameter.

This completes the procedure for navigating the card-edge menus of the 9216-OE-DM.

Note — *Do not power down the card before ensuring that all edited parameters are saved. Saving edited parameters can take up to 10 seconds.*

Card-edge Menus

Table 4.7 lists all the menus, and menu items available using the card-edge controls. To activate some of these parameters, it may be necessary to toggle **SW2** in either direction, or it may require that **SW2** be held in either direction for a few seconds. Default values are indicated with an asterisk (*). Refer to the section "**Menu Descriptions**" for a brief summary of the menus available on the card-edge.

Table 4.7 Card-edge Menus and Items

Menu Select	Card-Edge Menu Label	Menu Name	Card-Edge Item Label	Item Name
0	9216-OE-DM slot #	Home		
1	Fact Def	Factory Default	n/a	Factory Default
2	Ref Src	Reference Source	Fr 1*	Frame 1 Reference
			Fr 2	Frame 2 Reference
			Vid	Video
3	LOI	Loss of Input	Black	
			Blue	
			Custom*	
4	Test Patt	Test Pattern	None*	
			75%	SMPTE Bars
			YC Ramp	Y/C Ramp
			L Ramp	Luma Ramp
			Matr Path	Matrix Pathological
			Blue	Flat Field Blue
			Black	Flat Field Black

Menu Select	Card-Edge Menu Label	Menu Name	Card-Edge Item Label	Item Name
			Frq Swp	Frequency Sweep
			100%	100% Full Field Bars
5	Grp Sel	Group Select	Grp 1	Group 1
			Grp 2	Group 2
			Grp 3	Group 3
			Grp 4	Group 4
6	Grp Enbl	Group Enable	Enabled*	
			Disabled	
7	Ch1 Src	Channel 1 Source	Mute	
			T4k	4kHz Tone
			T2k	2kHz Tone
			T1k	1kHz Tone
			T.5k	500Hz Tone
			G1C1 - G4C4	Group 1, Channel 1 to Group 4, Channel 4
8	Ch2 Src	Channel 2 Source	Same as above	
9	Ch3 Src	Channel 3 Source	Same as above	
A	Ch4 Src	Channel 4 Source	Same as above	
B	AES Sel	AES Output Select	AES1*- AES8	AES 1 to AES 8
C	ChA Src	Channel A Source	G1C1 - G4C4	Group 1, Channel 1 to Group 4, Channel 4
D	ChB Src	Channel B Source	Same as above	

Menu Descriptions

This section briefly summarizes the menu parameters available in the card-edge display of the 9216-OE-DM.

0 — Home

This read-only menu displays the product name and the slot the card is installed in the frame.

1 — Factory Defaults

This function enables you to return all controls to their factory default values.

Use the following procedure to reset the card parameters to factory default values using the card-edge controls:

1. Rotate **SW1** to **1**. The Four Character Display displays "**Fact Def**".

2. Toggle **SW2** down and hold for 3 seconds.

3. Release **SW2**.

This completes the procedure to reset the card parameters to factory default values.

2 — Reference Source

This menu enables you to select where the card will look for a reference. The choices are Frame Reference 1 (**Fr 1**), Frame Reference 2 (**Fr 2**), and Video (**Vid**). Refer to the section "**Reference Compatibility**" for details.

3 — Loss of Input

Use this menu to select what type of video displays at the system's outputs when the input video signal is lost or invalid.

4 — Test Pattern

This menu enables you to specify the type of test pattern to output. Note that this setting is not retained on power down.

5 — Group Select

This menu enables you to select the embedded group before assigning sources to the channels, enabling the group, and selecting backup sources. This menu is used in conjunction with Menus 6 to E.

6 — Group Enable

Use this menu to determine if the selected group is embedded in the output or not.

7, 8, 9, A — Channel # Source

Use Menus 7 to A to configure the source that is inserted into the embedded group if present. These menus are used in conjunction with Menu 5 (Group Select). The following are the default values based on the group selected:

- Group 1 — When Menu 5 is set to Grp1, the default value of Menu 7 is G1C1.
- Group 2 — When Menu 5 is set to Grp 2, the default value of Menu 8 is G2C2.
- Group 3 — When Menu 5 is set to Grp 3, the default value of Menu 9 is G3C3.
- Group 4 — When Menu 5 is set to Grp 4, the default value of Menu A is G4C4.

B — AES Select

Use Menu B to specify an AES output to configure. This menu is used in conjunction with Menus C (Channel A Source) and D (Channel B Source). The default value is AES1.

C — Channel A Source

Use Menu C to select the Channel A source for a specific AES output. This menu is used in conjunction with Menu B (AES Select). The following are the default values based on the AES selected:

- When Menu B is set to AES1, the default value of Menu C is G1C1.
- When Menu B is set to AES2, the default value of Menu C is G1C3.
- When Menu B is set to AES3, the default value of Menu C is G2C1.
- When Menu B is set to AES4, the default value of Menu C is G2C3.

- When Menu B is set to AES5, the default value of Menu C is G3C1.

- When Menu B is set to AES6, the default value of Menu C is G3C3.

- When Menu B is set to AES7, the default value of Menu C is G4C1.

- When Menu B is set to AES8, the default value of Menu C is G4C3.

D — Channel B Source

Use Menu D to select the Channel B source for a specific AES output. This menu is used in conjunction with Menu B (AES Select). The following are the default values based on the AES selected:

- When Menu B is set to AES1, the default value of Menu D is G1C2.

- When Menu B is set to AES2, the default value of Menu D is G1C4.

- When Menu B is set to AES3, the default value of Menu D is G2C2.

- When Menu B is set to AES4, the default value of Menu D is G2C4.

- When Menu B is set to AES5, the default value of Menu D is G3C2.

- When Menu B is set to AES6, the default value of Menu D is G3C4.

- When Menu B is set to AES7, the default value of Menu D is G4C2.

- When Menu B is set to AES8, the default value of Menu D is G4C4.

Specifications

In This Chapter

This chapter includes the technical specifications for the 9216-OE-DM

The following topics are discussed:

- 9216-OE-DM Technical Specifications

- Channel Status Data Table

9216-OE-DM Technical Specifications

This section includes the technical specifications[**] for the 9216-OE-DM.

Table 5.1 9216-OE-DM Technical Specifications

Category	Parameter	Specification
Optical Input	Number of Inputs	1
	SMPTE Standards Accommodated	SMPTE 259M-C, SMPTE 292M
	Operating Wavelength Range	1210nm to 1600nm
	Input Power Operating Range (Color Bars)	-3dBm to -18dBm @ 2.97Gbps -3dBm to -19dBm @ 270Mbps and 1.5Gbps
	Input Power Operating Range (Pathological)	-3dBm to -17dBm @ 2.97Gbps -3dBm to -18dBm @ 270Mbps and 1.5Gbps
	Receiver Overload	At values above -3dB
	Connector	Single mode, LC/UPC
SDI Input	Number of Inputs	1
	SDI Data Rates and SMPTE Standards Accommodated	SMPTE 292M, SMPTE 259M-C
	Impedance	75ohm terminating
	Return Loss	>15dB to 1.485GHz
	Cable Length with Equalizer	>10dB from 1.485GHz to 2.97GHz
	Connector Type	>300m of Belden 1694A cable @ 270Mbps
SDI Outputs	Number of Outputs	1
	SDI Data Rates and SMPTE Standards Accommodated	SMPTE 292M, SMPTE 259M-C
	Impedance	75ohm
	Return Loss	>15dB to 1.485GHz >10dB 1.485GHz to 2.97GHz
	Signal Level	800mV, ±10%
	DC Offset	0V ±50mV
	Rise and Fall Time (20-80%)	700ps typical @ 270Mbps 120ps typical @ 1.485Gbps, 2.97Gbps
	Overshoot	<10%
	Connector Type	BNC
AES Outputs	Number of Outputs	8 AES-3id outputs
	Impedance	75ohm
	Resolution	24bits
	Voltage	1V p-p
	Sampling Rate	48kHz

[**] Specifications are subject to change without notice.

Category	Parameter	Specification
	Connector Type	DIN 1.1/2.3
Environmental	Operating Range	5°C to 40°C ambient
Power	Total Power Consumption	<8W

Channel Status Data Table

The following table shows the channel status bit information that is used for all output audio.

Table 5.2 Channel Status Data

Byte	Bit	Function	Transmitted
0	0	Professional or Consumer use of Channel Status Block	Professional (1)
	1	Normal Audio or Non-Audio Mode	Normal Audio (0)
	2-4	Emphasis	No Emphasis (100)
	5	Lock Indication	Locked (0)
	6-7	Sampling Rate	48kHz (01)
1	0-3	Channel Mode	2 channel stereo (0001)
	4-7	User Bit Mode	192-bit (0001)
2	0-2	Auxiliary Bit Usage	20-bit audio sample, Aux bits undefined (000)
	3-5	Sample Word Length	20- or 24-bits (101)
	6-7	Alignment Level	Not Indicated (00)
3	0-7	Multi-channel Modes	Undefined (0)
4	0-1	Digital Audio Reference Signal	Not a Reference (0)
	2	Reserved	0
	3-6	Sampling Frequency	Not Indicated (0000)
	7	Sampling Frequency Scaling Flag	No Scaling (0)
5	0-7	Reserved	Unused (0)
6-9		ASCII Source ID	Unused (0)
10-13		ASCII Destination ID	Unused (0)
14-17		Local Sample Address	Unused (0)
18-21		Time of Day	Unused (0)
22	0-7	C data reliability	Only the first 5 Status Bytes are marked as Reliable. All other Status Bytes are marked as Unreliable.
23	0-7	CRC	Calculated CRC

Passing the Status Bytes

The 9216-OE-DM replaces Channel Status Bytes according to **Table 5.2** or passes Status Bytes through from input to output. In order for the Channel Status Bytes on the incoming embedded stream to be re-embedded, the outgoing Data Word Length must match the specified word length in the Channel Status bits.

Service Information

In This Chapter

This chapter contains the following sections:

- Troubleshooting Checklist
- Warranty and Repair Policy

Troubleshooting Checklist

Routine maintenance to this openGear product is not required. In the event of problems with your 9216-OE-DM, the following basic troubleshooting checklist may help identify the source of the problem. If the module still does not appear to be working properly after checking all possible causes, please contact Technical Support at the numbers listed under the "**Contact Us**" section at the end of this manual.

1. **Visual Review –** Performing a quick visual check may reveal many problems, such as connectors not properly seated or loose cables. Check the module, the frame, and any associated peripheral equipment for signs of trouble.

2. **Power Check –** Check the power indicator LED on the distribution frame front panel for the presence of power. If the power LED is not illuminated, verify that the power cable is connected to a power source and that power is available at the power main. Confirm that the power supplies are fully seated in their slots. If the power LED is still not illuminated, replace the power supply with one that is verified to work.

3. **Reseat the Card in the Frame** – Eject the card and reinsert it in the frame.

4. **Check Control Settings –** Refer to the Installation and Operation sections of the manual and verify all user-adjustable component settings.

5. **Input Signal Status –** Verify that source equipment is operating correctly and that a valid signal is being supplied.

6. **Output Signal Path –** Verify that destination equipment is operating correctly and receiving a valid signal.

7. **Card Exchange** – Exchanging a suspect card with a card that is known to be working correctly is an efficient method for localizing problems to individual cards.

Bootload Button

In the unlikely event of a complete card failure, you may be instructed by Technical Support to perform a complete software reload on the 9216-OE-DM.

Use the following procedure to perform a software reload on the 9216-OE-DM:

1. Eject the card.

2. Press and hold the **Bootload** button, while re-inserting the card into the frame.

3. Release the button.

   The **PWR LED** will flash GREEN while the card is waiting for a new software load.

   If a new software load is not sent to the card within 60 seconds, the card will attempt to restart with the last operational software load.

Software can be uploaded to the 9216-OE-DM via DashBoard. Refer to your *DashBoard Control System Software User Manual* for further instructions.

Warranty and Repair Policy

Cobalt Digital Inc. Limited Warranty

This product is warranted to be free from defects in material and workmanship for a period of five (5) years from the date of shipment to the original purchaser, except that 4000, 5000, 6000, 8000 series power supplies, and Dolby® modules (where applicable) are warranted to be free from defects in material and workmanship for a period of one (1) year.

Cobalt Digital Inc.'s ("Cobalt") sole obligation under this warranty shall be limited to, at its option, (i) the repair or (ii) replacement of the product, and the determination of whether a defect is covered under this limited warranty shall be made at the sole discretion of Cobalt.

This limited warranty applies only to the original end-purchaser of the product, and is not assignable or transferrable therefrom. This warranty is limited to defects in material and workmanship, and shall not apply to acts of God, accidents, or negligence on behalf of the purchaser, and shall be voided upon the misuse, abuse, alteration, or modification of the product. Only Cobalt authorized factory representatives are authorized to make repairs to the product, and any unauthorized attempt to repair this product shall immediately void the warranty. Please contact Cobalt Technical Support for more information.

To facilitate the resolution of warranty related issues, Cobalt recommends registering the product by completing and returning a product registration form. In the event of a warrantable defect, the purchaser shall notify Cobalt with a description of the problem, and Cobalt shall provide the purchaser with a Return Material Authorization ("RMA"). For return, defective products should be double boxed, and sufficiently protected, in the original packaging, or equivalent, and shipped to the Cobalt Factory Service Center, postage prepaid and insured for the purchase price. The purchaser should include the RMA number, description of the problem encountered, date purchased, name of dealer purchased from, and serial number with the shipment.

Cobalt Digital Inc. Factory Service Center

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